DISTRIBUTED CENTRALIZATION:
WEB 2.0 AS A PORTAL INTO USERS' LIVES

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> *Because the inhabitants, as producers and as consumers, are drawn into the center in search of work and pleasure, all the living units crystallise into well-organised complexes. The striking unity of microcosm and macrocosm presents men with a model of their culture: the false identity of the general and the particular. – Adorno and Horkheimer*

Cybernetic loops, anxious movements, random patterns, professional- and amateur-made content, multiple browser tabs, viral propogation: all of these mark the use of Web 2.0 sites. Online, users move fluidly from one Web site to another. A user who enjoys a Lolcat video on YouTube can "like" it, thus producing a post in his Facebook stream. That user might then change tabs back to Facebook to read comments his friends posted about the video. A particularly snarky comment by one friend is so funny, the user tweets it in Twitter via TweetDeck. While in Twitter, he sees a Tweet for a Wikipedia article on Lolcats, so he clicks on the link. After reading up on the history of Lolcats, he notices a reference in the Wikipedia article to a *Colbert Report* skit about politician's cats, so he clicks on that and is sent to Hulu. He finds *that* video so entertaining that he "likes" it, starting the process all over again. This activity is noticed by one of this user's Facebook friends on her iPhone; she happens to be a reporter for the *New York Times* and writes a piece on viral digital culture and the production of a new Lolcat app for the Apple iPad. In the course of her reporting, she researches Lolcats with Google searches, feeding new search strings into Google's growing database. Once her article is posted on a *Times* culture blog, readers can log in to Facebook and notice that their friends are all reading that article, and they can start new threads of comments, "likes," Diggs, tweets, and maybe a new Internet meme.

This shifting movement between user-led and mass media content production on computers and mobile devices, with its accompanying loops that feed into dataveillant images of media consumption, is complex and difficult to map. There is a growing body of critical research that outlines the means by which Web 2.0 sites attempt to capture and create archives from these feedback loops. However, much of this work implies that these activities happen within "walled gardens" (such as Facebook or Google) just as might happen within older Internet services such as Compuserve or Prodigy. As powerful as Facebook or Google are, they aren't (yet) the whole Internet; rather, they are articulated within a wider network of third-party applications, major media companies, small blogs, and niche sites.

How do we map this movement? Langlois *et al* rightly suggest "that one entry point towards mapping Web 2.0 worlds is through platforms and through the visualization of the many connections operated by the platforms between users, content and protocols." [1] That is, we have to map Web 2.0 worlds by tracing their linkages in much the same way as users move from site to site: at one moment, we have to be at the interface level, and the next, we have to follow the code.

When we do this, we see that Web 2.0 as a whole is beginning to take a decidedly interconnected shape. Facebook, Google, YouTube, Wikipedia, Blogger, Twitter and other Web 2.0 sites are linked to one another in a complex and bewildering array of Application Programming Interfaces (APIs), user-created applications, links, protocols, and browser extensions. The hypothetical Lolcats

scenario described above points to the myriad ways these sites are linked within the shifting whims of an individual user.

To trace these connections, this paper draws on the intersection between computing, software engineering, and the management of labor in informational capitalism to uncover an architectural model with which to understand this complexity: the portal model. We will see how the interconnections between Web 2.0 sites, built on de facto protocols, is creating the Web as Portal, an architecture built to capture value produced by users, value that was previously hidden as unstructured data. Web 2.0 as a portal is rife with contradictions: on the one hand, the Web (and Internet) remain distributed networks, and Web 2.0 applications could easily be mapped as distributed. On the other hand, extremely popular sites such as Facebook (for social networking) and Google (for search), as well as the increasing interconnection between them, are rendering Web 2.0 to be a centralized network. This distributed centralization is part of the larger portal architecture, wherein heterogeneous sites are articulated into a network of networks.

To be fair, the concept of Web 2.0 as a portal is only an idealized structure; the Web remains a messy place. However, commercial Web 2.0 sites, built out of the free labor of users and enjoying power law distributions, have begun to carve out niches within the broader Web, effectively rendering them "portlets" in a larger architecture. As specialized sites such as Google and Facebook gain more monopoly power over their respective niches, they have also built means to interlink with other sites and one another. And, since user data is a non-rival good, Facebook, Google, Twitter are all willing to share in order to maintain and increase flows of user data into their archives. [2]

To explore this, first I will draw on the fifteen years of literature on the corporate portal. This networking architecture has been developed for corporate intranets, allowing for the management of far-flung transnational corporations and the creative processes of knowledge workers. Corporate intranet portals are part of the larger shift to a new hegemonic form of labor: precarious immaterial and cognitive labor. [3] This architecture involves collecting various applications, called "portlets," into an online interface. Like the "portal" metaphor implies, employees are meant to view their work-worlds through this circumscribed interface; this vision structures their knowledge work.

Then, using the descriptions of the corporate portal architecture as a roadmap, I will describe how Web 2.0 sites can themselves be conceptualized as portlets, modules within a larger portal architecture. Just as corporate portals allow for the management and abstraction of the knowledge work of employees, the Web 2.0 portal allows for the structuring and management of user-led "produsage." [4] I ultimately argue that the Web 2.0 portal is geared towards structuring the internal, emotional lives of users – for the benefit, of course, of marketing and the realization of surplus value locked in commodities.

Corporate Portals and the dream of realizing a "goldmine" of unstructured information

Looking to the portal as a model for Web 2.0's complex, networked structure is counterintuitive. After all, Web 2.0 is supposed to mean the death of the portal. During the late 1990s, in what we might retronymically call "Web 1.0," portals like Yahoo and Excite were geared towards attracting as wide an audience as possible. They did so by creating directories of Web sites in categories such as "News" and "Sports," producing original editorial content, and offering search, chat, and email services. In addition, Yahoo and Excite allowed users to personalize the site by selecting specific news and topical areas of interest to be displayed. In short, the portal model sought to be all things to all users, to be all-encompassing and authoritative and yet personal and inviting. As the name implies, the Web portal was meant to be a window into the Web which users could gaze through without ever leaving the safe, expert-created confines of the

portal site. Portals were, in fact, a mass media model applied to the Web, with the de-massified twist of degrees of personalization.

However, the Internet stock bubble burst of the early 2000s significantly reduced the production of mass media-style Web sites. In addition, Web 2.0 pundits have argued that the "long tail" [5] and decentralization of today's Web have buried the portal model for good in favor of "small pieces loosely joined" [6] – that is, small sites that focus on specific, niche services and allow users to pick and choose among them. One of the most notorious examples of failed portals is the Time Warner/AOL merger, which has become a symbol of pre-1999 thinking about the political economy of the Web. Thus, we are told, the Web shifts from a modernist, mass media environment to a postmodern space of bricolage and user-led customization – and even a return to pre-mass society economics and culture. [7]

Although mass media-style portals such as Yahoo's have been declared dead, the portal model has in fact lived on in the corporate world, largely as a potential solution to the problems of corporate IT architectures. Particularly after the advent of the minicomputer, corporations increasingly invested in IT equipment – personal computers for workers, networks, private data lines – multiplying the number of means of communication and information storage. This fragmentation of data storage occurred even though builders of corporate intranets eschewed peer-to-peer networking in favor of more centralized client/server architectures. This uneven and chaotic distribution of databases and information was especially exacerbated as corporations congealed into conglomerated, globalized transnational entities with more and more divisions. Most importantly, the databases scattered across divisions or even across countries were often incompatible. This mass of unstructured data was unwieldy, difficult to search, difficult to link together, and it represented countless years of labor to build, let alone maintain. In short, this data fragmentation was anathema in the "information age," since information and knowledge, not factories and labor, were ostensibly the most valuable assets of any corporation. [8]

The popularity of Yahoo in the 1990s led information technology pundits to argue that the portal could solve this problem, thus "unlocking" the goldmine of information hidden away in scattered servers, emails, text documents, and even in the heads of employees. Just as Yahoo had seemingly tamed the heterogeneous Web with a mix of directories, search, and personalization, all provided by an interface that could be accessed from any computer, so too could the corporate portal tame a company's information overload. As Martin White notes, "the holy grail of IT directors, especially in the corporate sector, has been to find some technology that integrates all these applications onto a single consistent desktop. The solution seems to be to implement portal software, so that the technology does all the work and users have a scalable universal interface to all existing and future applications." [9]

Although definitions of corporate portals often differ wildly (especially among vendors who are competing for business and thus attempting to differentiate their products), by and large the literature [10] describes portals as having the following features:

> *A desktop replacement* – Computers are universal machines capable of running many different programs, and employees can easily get lost in all of them. Do I use Word or WordPerfect? Which program do I use to transfer files, CyberDuck or FileZilla? The portal is meant to reduce this confusion by *replacing* the graphical desktop (that is, the metaphorical space on the screen that includes files, folders, and a trash can) and thus, for all extents and purposes replacing the underlying computer itself. It provides "access to all applications and information that the user needs regardless of whether these are local or networked." [11] This also allows the company to have a clearer inventory of software applications running on employees' computers. The portal is thus another layer of abstraction on top of the machine, simultaneously simplifying computer use and centralizing applications.

Single sign-on - Rather than asking employees to maintain several passwords for different sites across the intranet, portals would allow for a single accreditation to be linked to each employee. Not only would the employee benefit from not having to remember and change multiple passwords, the company would have a centralized accreditation database, complete with detailed access logs, and the company could set varying degrees of access permission for each employee or category of employees. Instead of allowing an employee elevated access (say to financial records) in one intranet domain while prohibiting access to that same information in another, the corporation could set consistent permissions precisely linked to each employee. [12] Moreover, individual employee activities can be better measured and monitored if their real-world identities are linked to their online identities.

Personalization - Different employees use different networked tools. The portal literature almost unanimously calls for employees to have the ability to select which tools they use and remove irrelevant ones. Instead of wasting time navigating parts of the intranet that are irrelevant to their jobs, employees could instead get to work on their tasks much more quickly. This would also benefit the company, because data is easily collected on which tools are frequently used and which are never used by employees. This data would help CIOs make decisions about future tools and features to build or purchase.

Content management - In a portal, the massive amount of text, images, and multimedia on corporate networks must be centralized into a content management system. [13] This becomes an "information warehouse" that can be managed and integrated into the flows of networks. [14] This would allow for employees producing public-facing documents such as Web pages or brochures to quickly gather content. Content management systems also allow users to upload content into the centralized system.

Collaboration tools - Similar to the content management system, collaboration tools would codify the process by which multiple people work on digital documents. Drawing on each of the previous features, collaboration tools link identified users with one another, with standardized applications, and with the needed content to build new documents. Since these tools are networked, collaboration can take place across spans of distance and time.

In theory, these features are accomplished by building portals out of small pieces called "portlets." [15] Portlets are the component parts of the portal containing a small amount of code dedicated to a specific task, often gathering information or sending data from the client's computer to a server. A user might have search, chat, HR, spreadsheet, and news portlets on his portal's desktop. They are modeled after computer desktop graphical interfaces, complete with window decorations and "close" and "minimize" buttons. Just as a user could close a window on her desktop, so too can she close a portlet and replace it with another. Portlets are thus interchangeable; a user might substitute one for another in order to gain access to different functions. This is the heart of the personalization aspect of portals, because it replicates the interface of the PC desktop.

However, while portals use portlets in the same manner as a computer's operating system uses local applications, portals can use networked or local applications. In the above list, the chat portlet might be a locally-based (i.e., client-side) application, but the spreadsheet program might be hosted on a server elsewhere on the intranet. This structure even allows for third-party portlets; a corporate portal might use a mix of internally stored applications with portlets that are hosted outside the corporate intranet. For all their central appearance, portals can in fact be a collection of widely distributed and hosted applications, databases, and users.

However, despite the possibility for distribution, in order to function properly, portlets must be linked to centralized systems that can confirm identity for single sign-on, ensure that the user's personalization persists, manage approved applications, and link databases to content management and collaboration tools. However unique a user's personalized portal is, all data must flow through the centralized system. Moreover, for portlets to interoperate, their connections must flow through a centralized service that could translate their various protocols and thus coordinate data flows from one portlet to another.

In this sense, portals are artifacts of distributed centralization. On the one hand, the components of the portal might be developed by a wide range of third-party vendors, and portlets are networked applications that do not necessarily reside on any particular intranet; they are thus distributed, networked structures. But the necessity to link them to authentication and coordination services centralizes them.

Managing globalization and structuring knowledge work

The literature on corporate portals speaks of multiple benefits, including reducing costs by cutting use of paper products and enabling employees to self-service (by finding HR forms on their own, for example); reducing employees' time to find data; enabling collaboration among employees, even across divisions of the organization, time, and space; and getting news out to employees faster, even if they're away from the main office. Access to information seems to be at the heart of each of these benefits.

However, considering these portals from a critical political economic perspective, the most salient benefits are twofold: first, an effective portal will allow for centralized management of even the most far-flung transnational corporation. Second, and most importantly, portals enable corporations to extract and structure the knowledge of their workers, even tacit knowledge that was previously inaccessible to management.

The globalization of the corporation and the increasing emphasis on information and networks are complementary processes. As Dan Schiller argues, especially after neoliberalism began in the 1970s, networks were increasingly valued by corporations which sought to commodify the fruits of the general intellect (i.e., local knowledge, scientific knowledge) and to expand into new labor and consumption markets in the developing world. [16] The corporate portal is one important artifact of this globalization. Just as Yahoo could introduce a mass media model to the distributed, far-flung Web, a corporation could create an internal mass medium to distribute its culture and receive feedback from employees.

This is especially true of corporations that rely on contingent workers: if transnational corporations outsource functions to third parties and increasingly rely on contractual labor, they still desire to maintain at least a surface-level cohesion. [17] Networked portals allow their employees (of all designations – full-time to part-time, temporary, or contractual) to access corporate information flows from home, office, in the pub, or while on vacation. The portal, then, acts as a channel of communication and as a corporate brand capable of binding employees to the organization, even if they're miles away from headquarters or if they relate to the corporation via contingent contracts.

Second, in capitalism, the process of rendering a worker's tacit knowledge into an alienated material form such as a machine or a process is nothing new. An example is in Adam Smith's *The Wealth of Nations*:

> In the first fire-engines, a boy was constantly employed to open and shut alternately the communication between the boiler and the cylinder, according as the piston either ascended or descended. One of those boys, who loved to play with his companions, observed that, by tying a string from the handle of the valve which opened this

> communication to another part of the machine, the valve would open and shut without his assistance, and leave him at liberty to divert himself with his play-fellows. One of the greatest improvements that has been made upon this machine, since it was first invented, was in this manner the discovery of a boy who wanted to save his own labour. [18]

Thus, the boy's embodied knowledge of the machine's operation, drawn from working with the machine and learning its rhythms, is transferred to another machine, albeit a simple one: a string. Smith does not go on to discuss the ownership of this invention, but presumably, in keeping with the traditions of private property and the appropriation of labor in capitalism, the boy's intellectual property transferred to the owner of the machine. Moreover, one would presume the capitalist would put the boy to work on some other task rather than paying him to play.

Although Smith's example is likely aprocryphal, [19] there is much empirical evidence of the process by which laborers' knowledge is transferred into machines. Harry Braverman's famous analysis of Taylorism offers many examples of "deskilling," or the alienation of skilled laborer's conceptual abilities and autonomy. [20] In deskilling, tools do not serve the worker, who can make decisions about their use based on the worker's knowledge of how a task is to be done; rather, workers serve and are dictated to by the tools themselves. David Noble's *Forces of Production* is also marked by the transfer of worker knowledge into machines. [21] Similarly, Shoshana Zuboff found that the embodied, tacit knowledge of workers in paper mills – so ingrained in them that they could judge the quality of paper by sensing the electricity in the air with their hair or by slapping paper pulp with their hands – was abstracted from them and encoded in computer systems. [22] Joan Greenbaum's analysis of clerical work uncovers similar abstraction happening in offices, where clerical processes become locked into various technologies and digitized. [23] Finally, as Eva Illouz [24] and Arlie Hochschild [25] have forcefully argued, even the highly subjective inner world of emotion is being abstracted and digitized in capitalism.

Likewise, at the heart of the corporate portal literature is the concept of "structuring" unstructured data. "Unstructured data" is often presented in the literature as something benign: "files, documentation, email, engineering drawings, project plans, product manuals, Web pages, etc., and is created on a variety of systems using a variety of formats." [26] Essentially, these are documents that have no structured metadata associated with them. In order to conceive of them as unstructured, these documents are compared to their Others: structured data sets such as information stored in tables, complete with elaborate categorization and metadata. Whereas structured data sets are easy to search and manipulate, unstructured documents are organized chaotically, difficult to search, and extremely difficult to manipulate with business intelligence tools. And yet, the portal literature repeatedly refers to this unstructured data as extremely valuable, as a "gold mine" [27] or as "information gems" [28] hidden away in corporate intranets. This makes intuitive sense: anyone who has hunted in vain for an old email or text document that contains a vaguely remembered nugget of information knows the frustration of difficult to search data. What portals promise is ability to manage these documents, label them with metadata, centralize them, and bring them into the domain of search engines, thus rendering this data coherent and accessible to the corporation. As Staab *et al* put it, "coherent integration of information is only possible with a conceptual basis that may sort loose pieces of information into a well-defined knowledge warehouse." [29] Portals promise this.

However, despite the benign discussion of structuring unstructured data, what the portal literature ultimately describes is the *structuring and subsequent appropriation of the creative, knowledge work of employees*. In her review of the portal literature, Cláudia Dias describes the transmogrification and digitization of knowledge: a knowledge worker acquires knowledge from "documents, e-mails, web pages, reports, and presented by the corporate portal web interface on the computer screen. Once read, this knowledge becomes information and is absorbed into the cognitive framework of each person. Information is then converted into

subjective knowledge, when the contents of the document read match the user's concepts during the cognitive process." [30] This knowledge is then "reinterpreted" when "subjective knowledge" is transcribed with "word processors, spreadsheets, presentation software, etc." This creative process is the true "gold mine" to be exploited with corporate portals. The production of unstructured data is, in fact, the processes of creative labor of the knowledge worker. The knowledge worker's task is to be creative, to generate new ideas from information streams and databases. The fact that this creative labor is "unstructured" means that these processes are largely tacit and thus far less accessible to management. The portal promises to capture – to structure – creative labor, to turn it into "understanding." [31] In his dissertation on corporate portals, Hong Tuan Kiet Vo argues that the return on the investment in portals arises largely from the structuring of unstructured, creative processes. [32] Vo uses the example of a business process that

> is highly unstructured and requires the processing of data and information that is dispersed across the organization. Furthermore, assume that the process is a business critical process and periodically conducted with great effort. With regard to these additional assumptions, a corporate portal implementation can offer access to the required data sources and furthermore facilitate the information process by the means of information services for data aggregation, validation, and reporting ultimately improving the effectiveness and efficiency of the process. [33]

Parsing this clinical language, we see that portals provide the means to divide, document, and digitize creative labor. It is a dual process of structuring internally held data (built, no doubt, by employees) and structuring the very processes by which knowledge workers gather data. Once it is structured, it can be managed, altered, abstracted, outsourced, or replicated in a machine. Creative, cultural labor thus becomes contingent labor, the work of the cognitariat. As Toby Miller argues, the cognitariat might be the lauded, exemplary worker of neoliberalism, but the cognitariat also suffers from "conditions of flexible production and ideologies of 'freedom'...," lacking "the organization of the traditional working class and the political entré of the old middle class." [34] The praise heaped on the "creative class" is concomitant with that class being drawn into the sphere of management and exploitation.

This creative labor is a true "gold mine," but one that is difficult to exploit. Cognitive laborers identify with their work far more than factory laborers in Fordism. As a consequence, they extend their own workdays and blur the lines between work and leisure. [35] However, the management challenge here is measurement and abstraction: "The content of labour becomes mental, but at the same time the limits of productive work become uncertain. The very notion of productivity becomes imprecise: the relationship between time and quantity of value produced becomes difficult to stabilise, because not all the hours of a cognitive labourer are equal in terms of productivity." [36] This explains in part the recurrence of the corporate portal in the literature and in software markets. The architecture of the portal promises to better gauge, reduce, and abstract the workflows of the cognitariat.

Furthermore, these twofold benefits can be synthesized: with management centralized and with the work processes of cognitive workers structured into data sets, transnational companies can effectively find and exploit cheaper sources of labor throughout the world. Formerly creative or affective forms of labor – customer service, computer programming, research, even grading students [37] – have been outsourced in part due to globalized information networks and corporate management via networked portals. Just as the networked portal is another layer of abstraction on top of the material networks on which it resides, the immaterial or cognitive labor of users becomes an abstraction. As Jodi Dean argues, "immaterial service-sector labor increases the abstraction and homogenization of work. Workers are more distanced from the specific tasks, tools, and products of their labor. And their labor tends to be the same insofar as all are required to have basic computer skills." [38] When cognitive labor is homogenized, the creative skills of the worker become unimportant, and the only factors in deciding who does

the work are: can I pay them less? And will they be flexible? After this, the global scan for cheap labor in unregulated markets can begin.

Even as it scours the world for precarious workers, the corporation can also create a unified culture with an effective portal. Although the literature on corporate portals presents personalization as a key feature of any portal, the literature also notes that all employees should be linked to the same portal. As Sugianto and Tojib note, portals "represent a customized, personalized, constantly changing mix of news, resources, applications, and e-commerce options intended to be the desktop destination for everyone in the organization and a primary vehicle through which people do their work." [39] Recognizing the role of the Web in distracting workers as well as enabling them, Sugianto and Tojib even go so far as to suggest that corporate portals even include "shopping services" so "employees can manage their work as well as personal matters without the intervention of other administrative staff." [40] They suggest corporations strike deals with third-party vendors to market goods directly to employees. [41] Thus, not only will employees' work patterns flow through the portal, but the diversions will, as well. This is an intranet version of the mass media spectacle and political organization qua the screen: "Instead of individuals linked to one another, each is linked to spectacle via the screen. Mass observation, or, better, the broadcasting and announcement of an event as an event to masses of people, produces and determines what is common, what is to be significant to the collective (and in so doing, produces what is to be the collective)." [42] In all, portals provide employees of the far-flung corporation a sense of cohesion and identity, while offering the corporation access to the abstracted, structured creative knowledge of its employees.

However, to be certain, the portal dream remains a dream long deferred. Many corporate portals fail. [43] On a technical level, even those that can associate various functions within a customizable interface – an difficult enough task – they must also access often incompatible databases scattered across the corporation's organizational divisions. Beyond these technological challenges, organizational researchers also note that often the very culture of a corporation must be changed in order to make a portal even possible.

Despite these failures, the dream of structured data remains a siren song to Corporate Information Officers. [44] If each employee's knowledge can in fact be reduced to a structured data set, the loss of a skilled employee would be less painful. Moreover, having a "knowledge database" has allowed companies to outsource an increasing number of previously internal functions; capitalism's age-old search for cheap labor has thus been digitized. And wherever the laborers are located, portals are part of larger systems of managing them. Despite their emphasis on "personalization," the design specifications and distribution of portals remains a management imperative, not that of the workers.

The architecture of the Web 2.0 portal

At first glance, the portal is a poor model for understanding Web 2.0. Aren't Facebook, Twitter, Google, and other social media sites in competition for the attention of users? However, the portal dream is not just an intranet dream, it is an Internet dream, a Web dream. Even though Web 2.0 has been heralded as a participatory, user-led phenomenon – something that is decidedly not a mass medium, but a "many-to-many" medium where small blogs compete with Clear Channel and *The New York Times* – oddly enough, a Web 2.0 portal is taking shape. As Langlois *et al* note, Web 2.0 sites are "primarily concerned with establishing the technocultural conditions within which users can produce content and within which content and users can be re-channelled through techno-commercial networks and channels." [45] I argue that these techno-commercial networks are best understood with the portal model. Here, I will focus on how Web 2.0 sites link together within the architecture of the portal.

Although there is much discussion of competition, at least at this point the interaction between these Web 2.0 sites is more akin to a standards consortium. Whereas traditional consortia worked on standards for interoperation of devices (MP3), the Web 2.0 consortium centers on the fact that data is a non-rival economic good. Facebook's ownership of my personal data is not threatened if Google owns a copy. Instead, the goal of Web 2.0 sites is to convince users to continuously produce new cybernetic commodities, and Web 2.0 sites have found that more interaction between them, not less, is the way to do this. If this requires Facebook, Google, the New York Times, and Twitter to link to one another via a series of APIs and thus share data, so be it.

As such, Facebook, Google, et al can be conceived of as portlets within a broader portal. Each has a specific function. They link to one another via a bewildering array of protocols, APIs, and user activities. Although the interconnections can be overwhelming, I will use the corporate portal feature set as a guide through them.

> *A desktop replacement* - With mobile computing and synchronization across the cloud, specific devices such as the home desktop, the office laptop, and the commute smartphone are less relevant. Web 2.0 applications add another layer of abstraction, one that resides on the Web, on top of machines. [46] In this way, users can move seamlessly between devices. The material facts of the underlying machines and their specific hardware and software configurations are hidden behind a layer of online tools: email and chat programs, video and image editing programs, office tools, and social networking sites. The material facts of a smartphone become almost invisible; [47] instead, the smartphone acts as a conduit between the user's activities and the network.
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> This aspect of the Web 2.0 portal is reflected in the production of what Johnathan Zittrain would call "tethered devices" such as computers using the Google Chrome Operating System or Apple's iPad. [48] The "apps" on these devices replace the traditional functionality of graphical operating systems. However, they "live" on the Web and not on the user's machine.
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> *Single sign-on* - This is possibly the most contested feature of the Web 2.0 portal, and of course it is the most important, because identification of individual users is key to the surveillance economics of online advertising. Which corporation will build the de facto online ID card? Facebook's Connect program is dominant here; through the Connect API, millions of sites allow users to sign in with their Facebook accounts. Sites such as *CNN*, *Joost*, and the *New York Times* use Facebook Connect as their user's de facto online identity card. Facebook Connect's role in vetting online identity is so effective that pundits argue that it is superceding open source identity efforts such as OpenID as well as potential government-backed ID systems such as that proposed in the *National Strategy for Trusted Identities in Cyberspace*. [49] Thus, Facebook's massive database of real-world identities is connecting well to marketers who desire increasingly granular data on potential customers; Facebook Connect allows third parties access to a user's name, profile picture, gender, networks, user ID, and list of friends. Even as Facebook users click away from Facebook.com, they can remain logged in to the SNS and thus their uses of other Web sites can be tracked with the resulted data stored for later analysis.
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> Moreover, Facebook is even linked to companies that ostensibly compete with it. Google's YouTube allows users to share videos on Facebook with a single click. One of Facebook's biggest competitors, MySpace, essentially ceded the social networking market by opening up its user base to Facebook via Facebook Connect; the two sites, which were previously divided along class and race lines, [50] seem to be merging, at least at the level of the login. And this works in reverse: a user of Google's Chrome OS or Android phone can download a Facebook app, thus signing into Google (via Chrome/Android) to sign into

Facebook to sign into the thousands of sites that use Facebook Connect. Again, because digital data is nonrival, there is no reason for Google or Facebook to exclude traffic from one another. They share data and compete instead for advertising revenue.

Personalization - Certainly, this differs from corporate portals in that the choice of which "apps" to use is driven by network effects rather than a centralized software inventory system decided by a CIO. The apps I choose to use will be driven more by what my contacts are using, rather than functionality or budget. The sheer breadth of applications on Android/Chrome OS, the iPad/iPhone, and within Facebook appear to provide the same sort of variety and decentralization as the broader Web. However, just as in a corporate Intranet portal, centralization occurs at the single sign-on stage. With more and more apps stored in the cloud and reliant on Facebook for credential checking, no matter how personalized my collection of apps is, I am still linked to central servers.

Content management - This is provided by media sharing and storage sites such as YouTube, Vimeo, Flickr, and Photobucket as well as office services Google Docs and Microsoft Office 365. YouTube, for example, not only allows users to share videos, it allows for their storage on Google/YouTube's servers. Facebook is one of the largest holders of images in the world. [51] While consumer-grade 1 terabyte hard drives are available, increasing users store their digital data in the cloud. [52] Again, this layer of abstraction allows users to forget about specific machines (smartphones, laptops, desktops) and focus instead on the data; the physical location of that data is less relevant.

Collaboration tools - Related to content management, centralized storage of photos or documents allows for multiple authors to collaborate. Flickr's photo tagging is a key example; hover over most images in Flickr to see collaborative tags of elements within the image. Google Docs allows for multiple authors to write a text in real-time. Much has been written about new forms of authorship in blogging, where the boundary between author and commenter is blurring. And of course, the exemplars of this process are wikis (Wikipedia is one example, but Wikia's entirely user-produced but for-profit site is growing rapidly).

While nothing is settled, the Web 2.0 Portal appears to be taking shape. Facebook is emerging as the source for single-sign on (although Twitter/OAuth is competitive here). Google remains dominant in search and in office collaboration tools. Multiple media sharing sites (e.g., YouTube, Vimeo, and Flickr) provide content management. All of these sites allow users to customize them. They can be linked together via APIs. Additionally, the slow process of conglomeration, mergers, and buyouts enables the larger firms to swallow up the smaller, integrating functionality into centralized sites (consider Google's purchase of Writely and YouTube, for example).

Structuring emotion and creativity in Web 2.0

What is being structured in Web 2.0? One might argue that the massive amounts of data on the Web is being structured. This would be an obvious progeny of Yahoo's portal model which was built on a directory of Web sites in the 1990s. Whereas Yahoo hired people to surf the Web and categorize sites, Web 2.0 classification (so-called "tagsonomies" and "folksonomies") will arise from the free labor of users. Indeed, if a "Semantic Web" ever arises, it will be in part due to the ad hoc ontological structuring conducted by everyday Web users. [53]

However, more fundamental - and more troubling - we ultimately see that the data to be structured is the *internal subjective lives and creative activities of users themselves.*

Like the unstructured, creative work processes of knowledge workers – the very processes that corporate portals promise to "structure" – what is alternatively called "consumption work," "prosumption," or "produsage" of Web users has traditionally been unstructured. However, as more users are drawn into the Web 2.0 portal, their produsage work falls under the gaze of site owners. Kristin Arola rightly notes the shift from open-ended Web authoring to "template-driven" Web design: "today being a Web writer does not mean creating a homepage, and it certainly doesn't mean understanding how servers, the Internet, (X)HTML, and CSS work. Trace the decline of once-popular web hosting services such as Angelfire and Geocities alongside the rise of social networking sites such as Facebook and MySpace and it becomes clear—for our students, the homepage has gone the way of the landline." [54] As increasing numbers of users eschew creating their own heterogeneous homepages for signing into the more homogenized Facebook or Google+, they become enclosed in a new form of digital primitive accumulation. Moreover, their "produsage" activities fall under the gaze of Web 2.0 site owners and can be disciplined with terms of service agreements, interface design, and location-aware tracking. [55]

For marketers, this structuring is highly beneficial. Why, for example, do some marketing campaigns "go viral" where others don't? Can marketers construct an environment for their marketing-viruses to propagate? How can they make users spread such viruses – and make that work fulfilling, participatory, and interactive? Recent marketing research suggests viral marketing campaigns can be effectively produced if marketers measure the "network value" (a concept similar to network effects) of individual customers to discover who is most influential in the social graph and then target these influential nodes with short, clever advertisements they can easily share. [56] To do this, one fundamental process has to occur: the users must be graphed: Sue has a relationship to Juan has a relationship to Dmitri. At the simplest level, human interaction is reduced to edges on a network graph; in essence, any connection between one person and another is enough to signify the existence of complex human relationships. Of course, someone with more edges must be far more influential. Thanks to the Web 2.0 portal, this graph has been constructed.

But this involves far more than simply mapping out social networks (as in social network analysis) or even producing predictive models of chaotic phenomena such as viral marketing. [57] The Web 2.0 Portal is engineered to actively shape its possibilities of use. Networks must be engineered in order for dataveillant, viral marketing to work. For a virus to propagate, a homogeneous environment must be produced. To produce such a network, social interaction is simplified to binary choices like "friend," "like," "trust." Other emotional scenarios (ambivalence, boredom, ennui, mania) are harder to graph, and thus might be like antibodies to marketing-viruses. Hence the Web 2.0 aesthetic of clean, user-friendly, abstract graphical interfaces.

In addition, the turn to affect in cultural studies provides a language to parse the structuring of emotional labor in social media. One is struck by Arlie Hochschild's landmark study of the management of emotional labor in service workers. As she describes, when elements of the private emotional system

> are taken into the marketplace and sold as human labor, they become stretched into standardized social forms. In these forms, a person's contribution of feeling is thinner, less freighted with consequence; but at the same time it is seen as coming less from the self and being less directed to the other. For that reason it is more susceptible to estrangement. [58]

So, too, is emotional work standardized in the Web 2.0 portal, just as previously unstructured creative work is structured by the corporate portal. If we are doing the "work of being watched," [59] then the Web 2.0 portal is our distributed-centralized worksite. There, we produce ourselves within the structure of the portal. As Langlois *et al* note, "Commercial Web 2.0 platforms are attractive because they allow us, as users, to explore and build knowledge and

social relations in an intimate, personalized way. In this dynamic, the commercialization of users and information is one of the central factors through which this enrichment takes place." [60] Thus intimate knowledge-building and socialization are mediated by commodification of those processes. Bifo argues that our daily lives and even our very bodies fail to provide us pleasure, and so in consequence we turn to cognitive work and competition for "narcissistic reaffirmation;" [61] if this is true, the pleasures of the Web 2.0 workplace (gaining followers, competing for the best comment, anxious browsing from tab to tab, intimate personalization) are effects of emotional standardization. Competition – a decidedly neoliberal value [62] – becomes part of the affective work of constituting networks and making emotional exchanges.

And of course, since Web 2.0 is built on the "perpetual beta" model, [63] Web 2.0 site portlets can be easily redesigned as our intimate, knowledge-building activities shift and change over time. [64] If our uses of the network become nonstandard, they can be appropriated quickly. The cost of this is emotional distortion. As Hochschild argues, emotional questions arise out of our (post)modern condition of uncertainty and fragmentation: What should I be feeling? and Who am I? These prompt us to look to our emotions for some grounding, some way to locate ourselves. But with feelings largely managed within emotional capitalism, "the commercial distortion of the managed heart becomes all the more important as a human cost." [65] Similarly, Eva Illouz has noted that emotion and economic logics have increasingly interpenetrated one another. [66] The personal in the political economic becomes personalized standardization.

Finally, just as corporate portals have in part allowed for the outsourcing of affective, flexible, creative activities such as customer service and computer programming, the Web 2.0 portal outsources affective work to new spheres of daily life. Web 2.0 is in part a response to the blurring identity-political and spatio-temporal boundaries between worker, consumer, producer, family member, lover, activist, and citizen. As leisure becomes work and work becomes "gamified," and as private and public spaces blur together, the Web 2.0 portal becomes the site through which all activities flow. As emotional work is alienated from users in Web 2.0, emotion appears as an avatar, a like, a click, a digital gift, or a Tweet. [67] Alienated, digitized emotion becomes an abstraction, rendering the physical location, social setting, or embodiment of the subject immaterial. If customer service can be done anywhere by anyone with the appropriate on-screen scripts to follow, so too can the affective work of subjects relating to one another.

* * *

I find it hard not to return to the bleak critiques of the culture industry offered decades ago by the Frankfurt School. In describing mass culture and marketing, Adorno and Horkheimer note that "it is claimed that standards were based in the first place on consumers' needs, and for that reason were accepted with so little resistance. The result is the circle of manipulation and retroactive need in which the unity of the system grows ever stronger." [68] Mark Andrejevic updates the tautology of marketing by noting that

> The refrain of the marketing industry (at least for public consumption) is that advertising does not instil desires, emotions, anxieties, but merely taps into already existing, perhaps latent, ones. If someone is moved by a targeted campaign to make a purchase that wouldn't have been made in the absence of the ad, the marketers have merely helped a consumer to realize his or her desire. This is the apparent indeterminacy of consumer desire: on the one hand reliant upon the ministrations of marketers, and on the other, an un-coerced invocation of latent subjective autonomy. Even as advertisers work to gather more information about consumers in order to manage their responses, they refer to their own increasingly slavish devotion to the whims of their targets. [69]

Thus, as the Web 2.0 portal increasingly becomes standardized and distributed, the dialectical relationship between user desire and marketing desire closes in on itself. Management of the

affective work of a Web 2.0 user is aimed squarely at the realization of surplus value locked in commodities; the affective play of a Web 2.0 user is aimed squarely at the production of the self *qua* declaring affinity with people and commodities in equal amounts. Web 2.0 sites link together to trace these playwork flows and to steer them towards the needs of marketers while satisfying users' desires. It is a difficult balance.

I conclude by taking serious the "portal metaphor." Who is looking through this portal? In the corporate model, the worker looks through the portal into the world of the the corporate intranet; thus the worker's vision is literally circumscribed by the corporate IT architecture. But in the Web 2.0 portal, it is increasingly apparent that the flow of the gaze is coming *from the Web towards the user*. The user is circumscribed within the Web 2.0 portal. To draw on Paul Smith, [70] the user is "cerned" by the mastering theory of Web 2.0, accepting a cultural patrimony as the ultimate networked sovereign consumer, and being encircled within the constraints of new media capitalism – the new culture industry. With Web 2.0 sites articulated together, the new culture industry has a unique vision into the subjective lives of users.

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